LITHOLOGIC LOG

LOCATION MAP:

BLM-5-527 •

NORTH

• BLM-1-435

NOT TO SCALE

NW 1/4 NW 1/4 NW 1/4 NW 1/4 S 33 T 20S R 3E

SITE ID: NASA-WSTF LOCATION ID: BLM-5-527

SITE COORDINATES (ft.):

N 232891.85 E 403363.61

GROUND ELEVATION (ft. MSL): 4551.80 (BRASS CAP)

STATE: NEW MEXICO COUNTY: DOÑA ANA

DRILLING METHOD: AIR-FOAM ROTARY

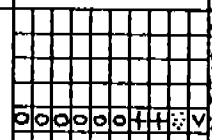
DRILLING CONTR.: LARJON

DATE STARTED: 4 MARCH 1988 DATE COMPLETED: 4 APRIL 1988

FIELD REP.: COOPER

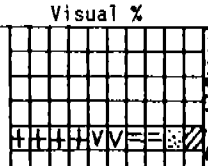
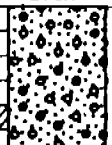
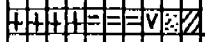
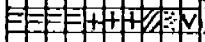
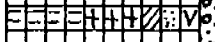
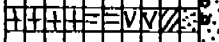
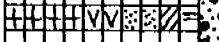
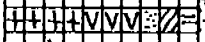
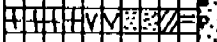
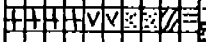
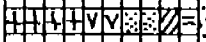
COMMENTS: 0'-100' 8 3/4", 0'-100' 14 3/4" ream, 100'-560' 9 7/8", 0'-100' steel casing, 560'-570' 2" core. Bedrock at 363'. Total depth = 570'.

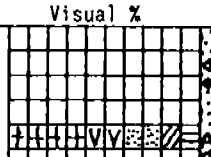
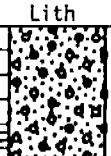
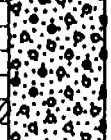
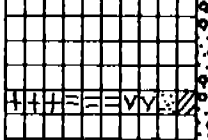
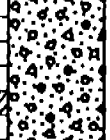
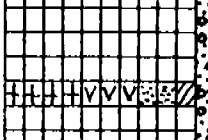
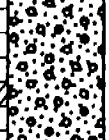
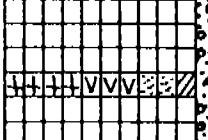
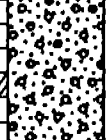
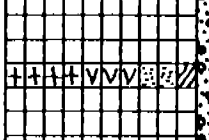
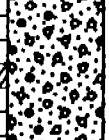
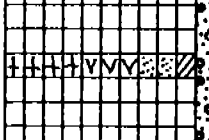
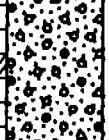
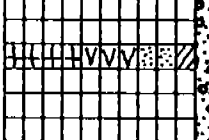
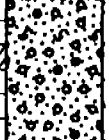
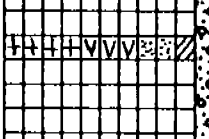
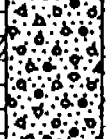
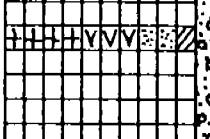
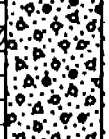
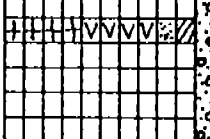
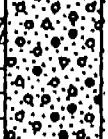
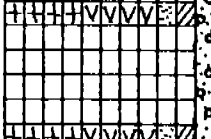
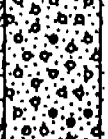
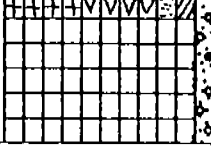
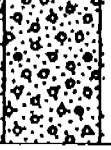
LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
5			8	0'-560' cuttings	* Note: In the following descriptions, grains are true formational grains. Cuttings have been broken or chipped by the drill bit and do not represent the true size and shape of grains within the formation.
10			4		0'-35' SURFICIAL ALLUVIUM: Unwashed samples throughout the interval are grayish orange (10YR 7/4) due to clay and silt content. Washed samples are 80% dark gray due to carbonate clasts and 20% multicolor from siltstones and volcanic clasts. Average cutting and grain size is 0.5 mm (0.2 inches), cuttings and grains range in size from 1 mm (0.04 inches) to 20 mm (0.75 inches). Grains in sample are rounded to subrounded, cuttings are blocky angular to angular chips. The lithology is an unconsolidated to poorly-consolidated gravelly alluvium with low clay content. Some hard caliche layers are present near the surface. The alluvium contains clasts of light to dark gray (N7 to N2) limestone and dolomite, white (N9) rhyolite with some iron staining, greenish gray (5GY 6/1) andesite, dusky red (5R 3/4) to dark reddish brown (10R 3/4) siltstone, transparent to milky gray quartzite.
15			4		
20			7		
25			6		
30			4		25'-35' Clay lens, significant increase in clay content in cuttings.
35			6		35'-365' GRAVELLY ALLUVIUM (Santa Fe Group): Unwashed samples are moderate orange pink (5YR 8/4) to light brown (5YR 6/4) in clay-rich zones and light gray (N7) to medium dark gray (N4) in zones containing little clay. Cutting and grain sizes range throughout interval from silt-size to 25 mm (1.0 inch). Grains from alluvium are subangular to rounded, whereas cuttings are subangular to angular. Numerous grains and cuttings throughout the interval have a caliche coating. The lithology is a poorly- to well-consolidated pebble to cobble conglomerate. It contains clasts of light gray (N7) to dark gray (N3) limestone, light gray (N7) dolomite, dirty white to white (N9) rhyolite with some iron
40			4		
45			2.5		
50			3		

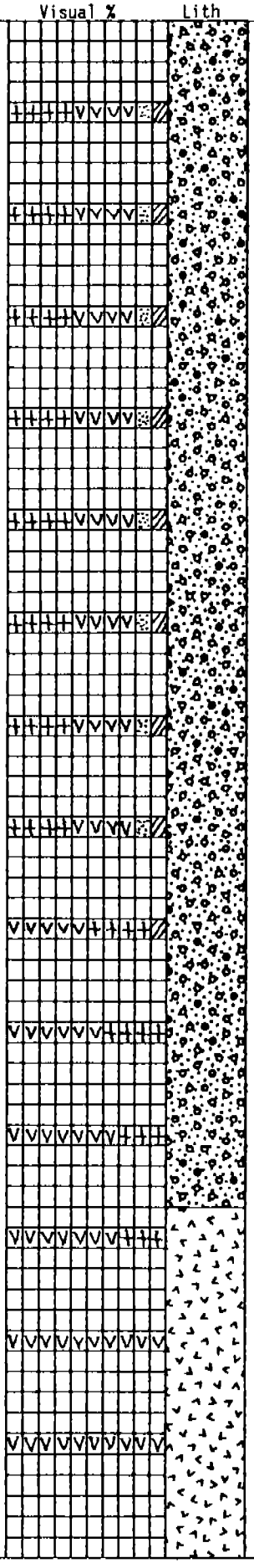
Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
50			3		35'-365'	GRAVELLY ALLUVIUM Continued: staining, grayish green (10GY 5/2) andesite, pale red purple (5RP 6/2) andesite, dark reddish brown (10R 3/4) to dusky red (5R 3/4) siltstone (Abo), transparent to milky gray quartzite, and small amounts of moderate brown (5YR 4/4) sandstone, granite and caliche in upper part of the interval.
55			3		35'-70'	Significant increase in cutting size, average size is 5 mm, sizes range from fine-grained sand to 20 mm (0.8 inches). Clay-rich zone containing the above-mentioned clasts. Clays balls up when samples are washed. Limestone is the predominant cutting and rhyolite is the predominant (~90%) igneous cuttings.
60			3			
65			3		45'-60'	Clay-rich lens, very sticky and balls up when washed.
70			1.5		70'-85'	Significant decrease in cutting size, average cutting size is 1 mm (0.05 inches). Well-consolidated zone containing ≤ 10% clay, very hard and bouldery. Limestone still predominant cutting and rhyolite predominant igneous cutting.
75			21			
80			10			
85			4.5		85'-190'	Average cutting size is 5 mm (0.2 inches), clay-rich zone with percentages ranging from 10% to 60%. Cuttings are mostly limestone, rhyolite, with quartzite and siltstone also present. Clay forms balls when samples are washed.
90			10			
95			5			
100			5			
105			4			
110			5			
115			3			

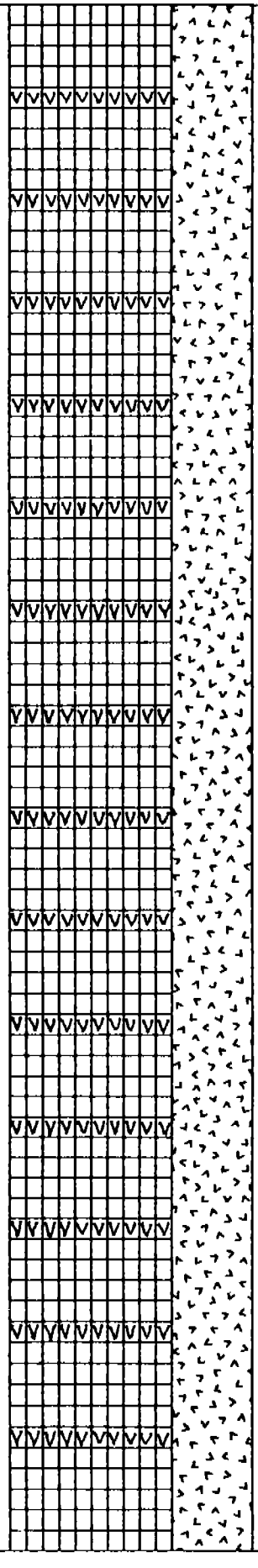
LOCATION ID: BLM-5-527

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
115			3		
120			9	120'-130'	Samples mixed together, overall percentage for 3 samples at 120'.
125			4		
130			4		
135			5		
140			4		
145			3		
150			3		
155			3.5		
160			4		
165			2		
170			4		
175			4.5		
180			3		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval		Lithologic Description
180			3			
185			3.5			
190			2		190'-350'	Limestone is predominant cutting but volcanic percentage increases with depth and limestone and volcanic percentages become more equal. White (N9) rhyolite is predominant igneous cutting.
195			3			
200			2		200'-230'	Significant decrease in cutting size to average of 2 mm (0.08 inches).
205			3			
210			3			
215			2			
220			2			
225			3			
230			4		230'-300'	Increase in cutting size to average 4 mm (0.02 inches).
235			4			
240			4			
245			4			

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
245			4		
250			4		
255			4.5		
260			4		
265			6		
270			4.5		
275			4		
280			18		
285			5		
290			6		
295			7		
300			15		300'-350' Significant decrease in cutting size to an average of ≤ 1 mm (0.04 inches). Cuttings so small that visual percentage is very hard to estimate.
305			5.5		
310			7		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
310			7		
315			5		
320			41		
325			10		
330			8		
335			7		
340			8		
345			12		
350			12	350'-365'	Increase in cutting size to average of 2-3 mm (0.12 inches). White (N9) rhyolite is predominant cutting with limestone percentage decreasing with depth. Amount of pale red purple andesite also increases slightly.
355			9		
360			12		
365			30	363'-560'	FLOW BANDED RHYOLITE: Dark reddish brown (10R 3/4) to dusky red (5R 3/4) with light bluish gray (5B 5/1) banding. Cuttings angular from 363'-515'; cuttings are subrounded to angular, 515'-525'; cuttings are angular, 525'-560'. Cuttings range in size from silt-size to 3 mm (0.12 inches). Cuttings show gradual color change with depth from predominantly dark reddish brown with light bluish gray banding to predominantly light bluish gray mottled with dark reddish brown. Color change is possibly due to greater exposure to oxygen near the surface causing oxidation of the rhyolite. Rhyolite is very dense and hard, however,
370			46		
375			38		

Depth	Visual % / Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
375		38		363'-560' FLOW BANDED RHYOLITE Continued: fracture zones drill significantly easier. Thin section observations indicate rhyolite is composed of 98-99% microcrystalline, equalgranular matrix of sanidine, plagioclase (?) and quartz and 1-2% phenocrysts of quartz and sanidine.
380		33		
385		30		
390		26		
395		37		
400		43		400'-430' Cuttings still angular but very fine-grained, average is < 1 mm (<0.04 inches), mostly silt size to very fine sand size cuttings present with very few greater than 1 mm (0.04 inches).
405		25		
410		34		
415		19		
420		43		
425		15		
430		17		430'-440' Cuttings angular, average cutting size is 2 mm (0.08 inches) and ranges from silt size to 3 mm (0.12 inches).
435		Drillograph broken 430'-440' --		
440		--		

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Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
440			--		
445			440'-445' 53		445'-465' Cuttings are silt size and pale brown (5YR 5/2) to moderate yellowish brown (10YR 5/4) in color.
450			51		
455			62		
460			61		
465			34		465'-490' Cutting size increases due to use of a thicker foam which lifts cuttings better and prevents them from being pulverized by the drill bit. Average size is 2 mm (0.08 inches).
470			17		
475			11		
480			32		
485			33		
490			16		490'-500' Significant decrease in cutting size. Cuttings are silt size < 1mm (<0.04 inches) and angular.
495			11		
500			22		500'-505' Slight increase in cutting size to 1 to 2 mm (0.04-0.08 inches). Cuttings still angular.
505			9		505'-515' Significant decrease in size of cuttings to silt size < 1mm (<0.04 inches). Cuttings are angular.

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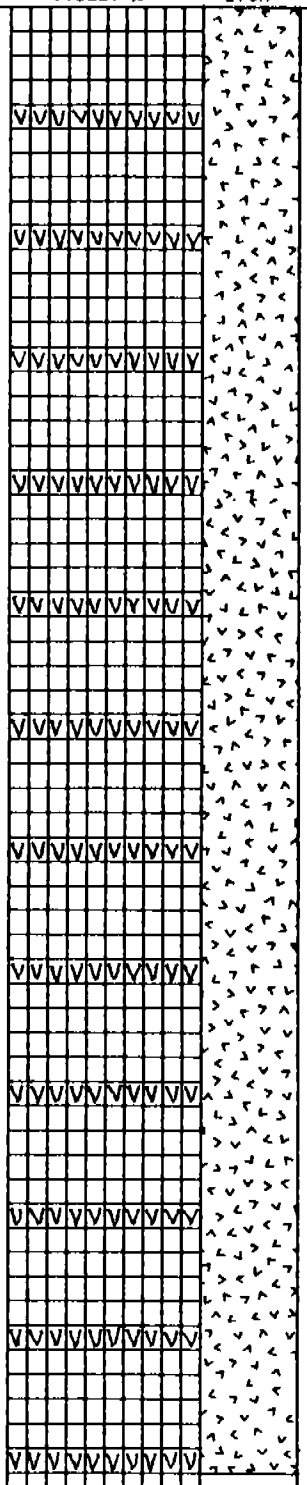
Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
505			9		
510			23		
515			10		515'-525' Significant increase in cutting size to 3 mm (0.12 inches) average size. Cuttings are subrounded to angular. Subrounded cuttings could be subrounded grains of the flow banded rhyolite. Rounding of the grains is possibly due to water permeating through a fracture zone and rounding brecciated fragments, or from an erosional surface between rhyolite flows.
520			18		
525			15		525'-548' Significant decrease in cutting size to ≤ 1 mm (≤0.04 inches).
530			11		528'-552' Possible fracture zone, significant increase in drilling rate. No cutting returns from 528'-548' during drilling. Unable to determine cutting shape due to cutting size.
535			8		
540			4.5		
545			4.5		
550			6		548'-550' Cuttings are silt size < 1mm (<0.04 inches). 550'-560' Increase in cutting size to 1-2 mm (0.04-0.08 inches). Sparse amounts of subrounded grains present.
555			16		
560			16	560'-570 core	560'-570' ***** core interval ***** see attached description ~ 2.5% recovery, core barrel collapsed.
565					
570					Total Depth = 570'.